

Report of the Landsat Data Continuity Mission (LDCM) Science Panel
From the
First LDCM Workshop
USGS HQ
Reston, Virginia
January 09 - 10, 2001

NASA and the USGS invited six prominent scientists to form one of the five discussion panels convened for the first LDCM workshop (see addendum for science panel members). All of the invited scientists brought extensive experience in the application of Landsat data to studies of land cover and land use change, land processes, and land surface dynamics. The science panel was asked to address four specific topics during the workshop: (1) define the scientific mission of the LDCM; (2) describe the attributes of the Landsat program, particularly Landsat 7, that are critical to the LDCM scientific mission; (3) describe improvements that could enhance achievement of the scientific goals; and (4) discuss addressing the scientific mission through a commercial data buy. The science panel met in a breakout session immediately following the workshop to review the exchange of views and ideas that occurred during the open forum. The following is a summary of the panel's comments and conclusions.

All panel members strongly agreed that the LDCM should be driven by the needs and requirements of global change science. The LDCM role was considered essential to a multi-resolution strategy for studying the earth over time. The panel regarded the LDCM role as a global survey mission providing imagery at a scale and resolution appropriate for monitoring regional land and biosphere dynamics, for assessing the impact of regional land management and policy decisions, and for recognizing the activities of man on the land surface. The panel also believed that an LDCM driven by science requirements would more than meet the needs of all other LDCM data applications, but that the collective requirements of education, resource management, and commercial development might not be sufficient for global change science. Consequently, the global change science requirements were viewed as the most stringent for the LDCM.

The science panel further agreed that the workshop served to highlight the public good of the Landsat program, particularly Landsat 7. They saw Landsat 7 and LDCM as critical components of a national geospatial information infrastructure essential to science, education, resource management, and economic development. The panel was particularly impressed by workshop reports of commercial development fostered by the Landsat 7 data acquisition strategy and data policy. A number of comments made during the workshop further demonstrated to the panel that the Landsat program is complimentary to the commercial remote sensing businesses rather than competitive. Examples were cited where the use of Landsat data led directly to the purchase of commercial remote sensing data. The panel also noted that the commercial data providers did not consider Landsat-like data commercially viable. The panel concluded that the U.S. Government must take responsibility for ensuring continuity of the Landsat Program.

Strong views were expressed with respect to the LDCM data policy. Non-discriminatory access to LDCM data and free and open sharing of data were considered essential to both the scientific mission and to other applications such as education and commercial development. Calls were made for further reduction in the price of Landsat data. The current cost-of-fulfilling-a-user-request (COFUR) price for Landsat 7 data, while a significant improvement over earlier commercial Landsat data prices, was still regarded as prohibitive to large region, global, and multi-temporal investigations. The full potential of the Landsat 7 mission and future potential of the LDCM can not be exploited until investigators can afford the Landsat data required for large scale studies. The panel failed to understand why the pricing policy for Landsat 7 data was diametrically opposed to the no-cost policy for data from all other Earth Observing System platforms and sensors. The panel strongly recommended a significant reduction in the price of Landsat 7 data and the continuation of a low-cost to no-cost policy for the LDCM.

The panel considered the scale, resolution, and spectral qualities of Landsat 7 ETM+ data as essential characteristic for continuation in the LDCM. They regarded the synoptic view afforded by the 185 km swath width of the ETM+ as necessary for the LDCM and recommended adding a specification for a wide swath width to the LDCM Data Specification. They also concurred with comments heard during the workshop that departure from the World-wide Reference System (WRS) would greatly hinder change detection and studies of change over time. Thus, the panel also recommended adding a requirement for acquiring data along the WRS orbital paths to the Specification. The 30 m resolution of Landsat 7 data with a sharpening band was considered appropriate for the LDCM. The ability to recognize man's activities and discriminate those activities from natural processes at that resolution was reiterated. The specified LDCM spectral bands were not discussed in detail, but the spectral coverage met general approval with one notable exception.

The panel was disconcerted by the lack of an LDCM specification for a thermal band. The value and utility of the Landsat 7 thermal band was revisited particularly with respect to improved monitoring of surface energy and water fluxes, cloud screening, urban mapping, and natural hazards monitoring. The panel considered a thermal band critical to the full success of the LDCM and firmly recommended adding a thermal band specification.

The panel also expressed concern regarding the commercial data buy approach. They feared that the requirements of the scientific community for systematic coverage of the global land mass might be disregarded in a commercial operation and cited the previous experience with the commercialization of Landsat 4 and Landsat 5. They questioned the incentives for a commercial firm to engage the scientific community in the design, development, and operation of an LDCM. They saw a great deal of risk in applying the data buy approach to a mission they regarded as predominantly scientific. The panel did recommend a series of workshops on the LDCM Data Specification to ensure that the Specification reflected scientific requirements.

The panel ended the session by discussing the urgent need for a long term Landsat program strategy. They noted that the Landsat missions had for the most part been developed one-at-a-time resulting in an unstable program with an uncertain future. This approach was considered inefficient and unnecessarily costly. They further noted that an extended Landsat data gap was avoided only due to the extraordinary longevity of Landsat 5, a matter of sheer luck. The advancements implemented for Landsat 7 with respect to the data acquisition strategy, data sharing policy, and reduced data price were seen as large steps in the right direction, but the panel did not believe that the LDCM assured further progress given the commercial data buy directives and the lack of a long term U.S. Government commitment to the program. The panel recommended that responsibility for the Landsat program should migrate to an operational federal agency with a long term commitment. They suggested that the LDCM could be regarded as a bridging mission to an operational series of satellites in a manner similar to the NPOESS Preparatory Project. The panel believed that the U.S. Government should develop a strategy for ensuring the continuity of the Landsat data record for decades to come.

ADDENDUM

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